



## Department of Energy

Washington, DC 20585

June 8, 1998

Mr. Andrew M. Hutton  
Director of Operations  
Thomas Jefferson National  
Accelerator Facility (TJNAF)  
12000 Jefferson Avenue  
Newport News, Virginia 23606

Dear Mr. Hutton:

This letter responds to your August 8, 1997, request for exemption from certain provisions contained in Title 10, Code of Federal Regulations, Part 835 (10 CFR 835), "Occupational Radiation Protection." On March 23, 1998, the Office of Energy Research forwarded your request to this office with their recommendation for approval.

This response concerns your request for exemption from the Surface Radioactivity Values for beta-gamma emitters, specifically for Beryllium-7 (Be-7), contained in Appendix D to 10 CFR 835. The purpose of the exemption request was to obtain relief from requirements associated with defining, posting, controlling, and monitoring contamination and high contamination areas.

The Office of Worker Health and Safety (EH-5) conducted a technical review of the exemption request (enclosed). Based on our review of the materials that were provided and a site visit by one of our staff members, the Department of Energy (DOE) is granting an exemption (with conditions) from 10 CFR 835, Appendix D, Surface Radioactivity Values for beta-gamma emitters, for the radioisotope Be-7. This exemption only applies to activities conducted in the controlled area. Unrestricted use and release of material must still comply with other applicable requirements.

DOE considered the many unique features of the exemption request and the site specific logistics affected by granting the exemption request. Some of these features include the minimal areas affected, the levels and locations of the contamination, and the radiological hazard from the contamination, the difficulty in meeting the requirements as written, and the minimal

improvement in safety gained by meeting the requirement. In the past, DOE has not granted certain exemption requests from Appendix D values. Your request is granted because of the unique features of your request that allows DOE to determine, per 10 CFR 820.62, that the exemption request adequately discusses the special circumstances which warrant the exemption.

The enclosed technical review provides additional information concerning the exemption decision.

The DOE Office of Energy Research concurs with this exemption decision.

Sincerely,

A handwritten signature in black ink, appearing to read "Peter N. Brush", with a long horizontal flourish extending to the right.

Peter N. Brush  
Acting Assistant Secretary  
Environment, Safety and Health

Enclosure

cc w/enclosure:

M. Krebs, Office of Energy  
Research

J. Hall, Oak Ridge Operations  
Office (OR)

M. Henderson, OR

B. Parks, Office of Environment, Safety  
and Health Technical Support

J. Conley, DOE TJNAF

Keith Christopher, Office of Enforcement  
and Investigation

Docketing Clerk, Office of Nuclear  
and Facility Safety

Radiological Control

Coordinating Committee

Price Anderson Amendments

Act Committee

## **TECHNICAL REVIEW**

### **Thomas Jefferson National Accelerator Facility Exemption Request for Title 10, Code of Federal Regulations, Part 835 (10 CFR 835)**

The Thomas Jefferson National Accelerator Facility (TJNAF) requests exemption from certain requirements of 10 CFR 835, "Occupational Radiation Protection." TJNAF requests relief from certain requirements for defining, posting, and controlling contamination and high contamination areas. The Office of Worker Protection Programs and Hazards Management (EH-52) concurs with this request for exemption.

### **Discussion**

#### **Request**

TJNAF specifically requests relief from the surface radioactivity values specified in Appendix D to 10 CFR 835 as they pertain to the radioisotope Beryllium-7 (Be-7). These values are used for the following: (1) defining contamination and high contamination areas; (2) radioactive contamination control and monitoring; and (3) posting of contamination and high contamination areas.

Generally, TJNAF is requesting the exemption to allow use of a surface radioactivity value (30,000 dpm/100 cm<sup>2</sup>) for Be-7 that will be easier to detect using field instrumentation. Use of the current surface radioactivity values for Be-7 (1,000 dpm/100 cm<sup>2</sup> removable and 5,000 dpm/100 cm<sup>2</sup> total) requires the following: (1) analyzing samples in a laboratory setting using high resolution equipment; (2) more time consuming surveys, which are sometimes performed in Radiation Areas or High Radiation Areas and result in higher external exposure to ionizing radiation; (3) establishing contamination control requirements in areas which result in more time being spent in Radiation Areas and High Radiation Areas; and (3) subsequent higher external exposures to ionizing radiation.

On August 8, 1997, TJNAF submitted the request for exemption to the TJNAF DOE Site Office. The DOE Site Office and DOE Operations Office reviewed the request, recommended approval, and forwarded the request to the Program Office, the Office of Energy Research. On March 23, 1998, the Office of Energy Research forwarded the request with their recommendation for approval to this office.

## Requirements from which Exemption is Sought

### APPENDIX D TO PART 835-SURFACE RADIOACTIVITY VALUES

Surface Radioactivity Values; in dpm/100 cm<sup>2</sup>

Nuclide	Removable	Total (Fixed + Removable)
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above.	1,000	5,000

#### Analysis

The request for exemption states that granting the exemption request will not increase the risk to individuals above the acceptable risk from other radionuclides (this is based on a comparison of Annual Limits on Intake (ALIs) for applicable radionuclides); will result in lower external exposures to individuals and thereby help reduce the overall risk to individuals; and will eliminate the unnecessary analyzing of samples in a laboratory setting that requires use of high resolution equipment.

#### Acceptable increase in risk from internal exposure

The request for exemption states that granting the exemption request to establish surface radioactivity values for Be-7 at 30,000 dpm/100 cm<sup>2</sup>, which is 30 times greater than the removable surface contamination limit, does not increase the risk compared to the surface radioactivity values (1,000 dpm/100 cm<sup>2</sup> removable and 5,000 dpm/100 cm<sup>2</sup> total) for other beta-gamma emitters, such as Cobalt-60 (Co-60). The request notes that the annual limit on intake (ALI) for Be-7 is approximately 800 times greater than the ALI for Class Y Co-60. The request provides this information to support the contention that all other factors being equal and assuming that intakes are directly proportional to loose surface radioactivity values, the increased risk (i.e., potential increased internal exposure) associated with raising the removable surface radioactivity value for Be-7 by a factor of 30 (and the total surface radioactivity value by a factor of 30) would still be within the risk values derived from Appendix D. The risks would still be lower than that allowed for numerous other radionuclides, such as Co-60.

The request also referenced other evaluations that came to similar conclusions. The evaluations were conducted by international and foreign radiation protection committees as well as other U.S. Government agencies.

As part of the analysis, EH-52 compared the ALI for Be-7 with the ALI for Class W Co-60. The ALI for Class W Co-60 is less restrictive than the ALI for Class Y, which was discussed in the exemption request. The ALI for Be-7 is still approximately 120 times greater than the ALI for Class W Co-60. Therefore, even using the more conservative comparison of the Be-7 ALI with the ALI for Class W Co-60, all other factors being equal and assuming that intakes are directly proportional to loose surface radioactivity values, the increased risk associated with raising the surface radioactivity value for Be-7 by a factor of 30 would still be within the current risk values derived from Appendix D.

EH-52 staff visited the facility, toured the locations in question, and discussed with site personnel the contamination levels typically encountered as well as contamination control practices and airborne radioactivity monitoring in place. EH-52 concludes that granting this exemption request is not likely to result in any significant increased internal exposures to ionizing radiation. However, as part of an effective contamination control program, it would be reasonable and prudent to post the discrete, well known, locations with the Be-7 contamination above the Appendix D values to warn individuals of the presence of contamination. Accordingly, EH-52 recommends that these locations be posted, marked, or labeled warning individuals not to enter without the proper radiological control authorization.

#### Overall reduction in risk from reduced external exposure

The request for exemption states that granting the exemption request to establish surface radioactivity values for Be-7 at 30,000 dpm/100 cm<sup>2</sup>, which is 30 times greater than the removable surface contamination limit, will result in reduced risk to individuals due to reduced external exposures to ionizing radiation. Contamination at the TJNAF is often located in Radiation Areas and High Radiation Areas. To meet current requirements requires careful, time consuming surveys in these areas because field detection of Be-7 is difficult. In addition, activities in areas which exceed the Appendix D values frequently must be conducted in a manner in which contamination control equipment and staging areas are established. The set up and use of contamination control equipment in Radiation Areas and High Radiation Areas and subsequent work under conditions requiring contamination controls result in additional individuals (e.g., Radiological Control Technicians) spending additional time in these areas. This results in additional external exposures to ionizing radiation.

During the EH-52 staff visit to the facility the locations in question were toured and discussions were held with site personnel on current contamination control practices. EH-52 staff also reviewed the DOE Occupational Radiation Exposure 1996 Report (the most recent available report). The collective total effective dose equivalent (TEDE) for the site was less than 3 person-rem, with the average measured exposure being 0.031 rem TEDE. These numbers reflect operations that already have relatively small exposures to ionizing radiation.

Based on observations made during the site visit and based on working knowledge of the time and personnel requirements needed to establish contamination controls consistent with 10 CFR 835, EH-52 concludes that granting this exemption request may result in some minimal reduction in external exposure to ionizing radiation at the facility. However, even a minimal external dose reduction gained from granting this exemption is consistent with the DOE policy of keeping exposures as low as reasonably achievable, especially considering that no additional costs are required to reduce the exposure.

In addition to reducing, somewhat, the risk from external exposure, granting this exemption request may also reduce risks from industrial hazards encountered in the workplace. Notably, primary locations where Be-7 accumulates are the filter elements in the air handling units located 80 feet above the floors of the experimental halls. The filter elements or system is serviced on/or about a monthly basis and is accessible only via a lifting device, such as a cherry picker. Reducing the need for personnel protective equipment and personnel to perform contamination surveys and provide radiological coverage will reduce the potential for industrial accidents while accessing and working in the air handling units.

#### Difficulty in meeting Appendix D values

The request for exemption states that granting the exemption request to establish surface radioactivity values for Be-7 at 30,000 dpm/100 cm<sup>2</sup> will assist facility operations. To meet requirements work must proceed slowly because of the difficulty in detecting Be-7 at the required levels with portable field instruments. This is due to Be-7's decay by electron capture, which results in emission of a photon less than 10 percent of the time. This is much more difficult for a portable contamination survey instrument, such as a Geiger Mueller detector, to detect than a radionuclide that emits a charged particle 100 percent of the time, such as Co-60. To meet requirements frequently requires analyzing samples in a laboratory setting using high resolution equipment.

DOE is aware of this difficulty, which is not unique to Be-7, and is currently working toward developing a technical basis for revising the 10 CFR 835 Appendix D values. The reasons cited by TJNAF in their exemption request are consistent with DOE's working toward developing new Appendix D values that are more closely related to risk.

During the EH-52 staff visit to the facility, discussions were held with site personnel on the site's contamination survey practices. Based on observations made during this visit, discussions with site personnel, and based on working knowledge of the difficulties in detecting these types of radionuclides at the current values in 10 CFR 835, EH-52 concludes that granting this exemption request will allow for easier implementation of the radiation protection program. As stated above, this will be accomplished without an unacceptable potential increased risk of internal exposure and with somewhat of a decrease in external exposures to ionizing radiation.

## Conclusions

10 CFR 820.62 requires that exemption requests discuss the special circumstances that warrant the exemption. It is EH-52's position that TJNAF has successfully demonstrated that this exemption request meets the following special circumstances: (1) application of the requirements in the particular circumstances would not serve or is not necessary to achieve its underlying purpose or (2) would result in resource impacts that are not justified by the safety improvements.

The exemption request should be granted with the following conditions:

TJNAF revise their Radiation Protection Program to reflect the following:

### APPENDIX D TO PART 835-SURFACE RADIOACTIVITY VALUES

Surface Radioactivity Values; in dpm/100 cm<sup>2</sup>

Nuclide	Removable	Total (Fixed + Removable)
Be-7	30,000	30,000
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90, Be-7, and others noted above.	1,000	5,000

The TJNAF should clearly state in their Radiation Protection Program that this exemption only applies to activities conducted in the controlled area as defined in 10 CFR 835. Unrestricted use and release of material must still comply with other applicable requirements.

Also, the Radiation Protection Program should identify locations historically known to have areas with Be-7 contamination above the Appendix D values (i.e., 1000 and 5000) and post, mark, or label to warn individuals not to enter without the proper radiological control authorization.

### Concurrence

Consistent with the technical position provided above, EH-52 fully concurs with the TJNAF exemption request with the specified conditions.

### Duration of Exemption

The duration of exemption is permanent or until the surface radioactivity values for Be-7 are modified in a future amendment to 10 CFR 835.

## EXEMPTION DECISION

Pursuant to title 10, Code of Federal Regulations, part 820.61 (10 CFR 820.61), the Assistant Secretary for Environment, Safety and Health (EH-1) is authorized to exercise authority on behalf of the Department of Energy (DOE) with respect to requests for exemptions from nuclear safety rules relating to radiological protection of workers, the public, and the environment.

On August 8, 1997, the Thomas Jefferson National Accelerator Facility (TJNAF) filed a request with the Department for permanent exemption from certain requirements of Title 10, Code of Federal Regulations, Part 835 (10 CFR 835), "Occupational Radiation Protection." In particular, TJNAF requests relief from certain requirements in 10 CFR 835, Appendix D, which specifies values used for the following: (1) defining contamination and high contamination areas; (2) radioactive contamination control and monitoring; and (3) posting of contamination and high contamination areas.

The request states that the exemption is not prohibited by law; will not present an undue risk to the public health and safety, the environment, or facility workers; and is consistent with the safe operation of a DOE nuclear facility.

Under the terms set forth in 10 CFR 820.61, I am the Secretarial Officer granted review and approval authority for exemption requests made with respect to 10 CFR 835. Based on a review of the supporting documentation, I find that the request set forth above has been justified for relief from 10 CFR 835 Appendix D values, as applicable to beryllium-7. Specifically, I find that the exemption criteria at 10 CFR 820.62 have been met. I have determined that the exemption is authorized by law; will not present an undue risk to the public health and safety, the environment, or facility workers; and is consistent with the safe operation of a DOE nuclear facility. I also find that the special circumstances, described in the technical position prepared by the Office of Worker Protection Programs and Hazards Management, constitute a sufficient basis upon which to grant this exemption.

On the basis of the foregoing, I hereby approve TJNAF's request for exemption from the stated sections of 10 CFR 835 on a permanent basis or until the surface radioactivity values for Be-7 are modified in a final revision to 10 CFR 835.

The exemption is contingent on the condition that TJNAF revise their Radiation Protection Program to reflect the following:

## APPENDIX D TO PART 835-SURFACE RADIOACTIVITY VALUES

Surface Radioactivity Values; in dpm/100 cm<sup>2</sup>

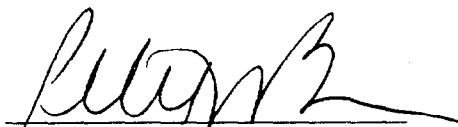
Nuclide	Removable	Total (Fixed + Removable)
Be-7	30,000	30,000
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90, Be-7, and others noted above.	1,000	5,000

The TJNAF shall clearly state in their Radiation Protection Program that this exemption only applies to activities conducted in the controlled area as defined in 10 CFR 835. Unrestricted use and release of material must still comply with other applicable requirements.

The Radiation Protection Program shall identify locations historically known to have areas with Be-7 contamination above the Appendix D values (i.e., 1000 and 5000) and post, mark, or label to warn individuals not to enter without the proper radiological control authorization.

Pursuant to 10 CFR 820.66, TJNAF has 15 days from the date of the filing of this decision to file a Request to Review with the Secretary. The Request to Review shall state specifically the respects in which the exemption determination is claimed to be erroneous, the grounds of the request, and the relief requested. If no Request to Review is submitted, the exemption decision becomes a final order 15 days after it is filed.

6/3/98  
Date

  
Peter Brush  
Acting Assistant Secretary  
Environment, Safety and Health